Space Transportation System
Space Shuttle Main Engine

THIS TEXT IS A SAMPLE TEXT, IT WAS COPIED VERBATIM FROM "WINGS IN ORBIT" AS A PLACE HOLDER!

NASA faced a unique challenge at the beginning of the Space Shuttle Program: to design and fly a human-rated reusable liquid propulsion rocket engine to launch the shuttle. It was the first and only liquid-fueled rocket engine to be reused from one mission to the next during the shuttle era. The improvement of the Space Shuttle Main Engine (SSME) was a continuous undertaking, with the objectives being to increase safety, reliability, and operational margins; reduce maintenance; and improve the life of the engine's high-pressure turbopumps.

The reusable SSME was a staged combustion cycle engine. Using a mixture of liquid oxygen and liquid hydrogen, the main engine could attain a maximum thrust level (in vacuum) of 232,375 kg (512,300 pounds), which is equivalent to greater than 12,000,000 horsepower (hp). The engine also featured high-performance fuel and oxidizer turbopumps that developed 69,000 hp and 25,000 hp, respectively. Ultra-high-pressure operation of the pumps and combustion chamber allowed expansion of hot gases through the exhaust nozzle to achieve efficiencies never previously attained in a rocket engine.

Requirements established for Space Shuttle design and development began in the mid 1960s. These requirements called for a two-stage-to-orbit vehicle configuration with liquid oxygen (oxidizer) and liquid hydrogen (fuel) for the Orbiter's main engines.

In 1971, the Rocketdyne division of Rockwell International was awarded a contract to design, develop, and produce the main engine.

The main engine would be the first production-staged combustion cycle engine for the United States.
The staged combustion cycle yielded high efficiency in a technologically advanced and complex engine that operated at pressures beyond known experience. The design team chose a dual-preburner powerhead configuration to provide precise mixture ratio and throttling control. A low- and high-pressure turbopump, placed in series for each of the liquid hydrogen and liquid oxygen loops, generated high pressures across a wide range of power levels.

A major requirement in engine design was the ability to operate at various power levels. The original engine life requirement was 100 nominal missions and 27,000 seconds (7.5 hours) of engine life. Nominal thrust, designated as rated power level, was 213,189 kg (470,000 pounds) in vacuum. The life requirement included six exposures at the emergency power level of 232,375 kg (512,300 pounds), which was designated 109% of rated power level. To maximize the number of missions possible at emergency power level, an assessment of the engine capability resulted in reducing the number of nominal missions per engine to 55 missions at 109%. Emergency power level was subsequently renamed full power level.

This recording project is part of the Historic American Engineering Record (HAER), a long-range program to document historically significant engineering, industrial, and maritime works in the United States. The HAER program is administered by the National Park Service, U.S. Department of the Interior. The Space Transportation System recording project was cosponsored during 2011 by the Space Shuttle Program Transition and Retirement Office of the Johnson Space Center (JSC), with the guidance and assistance of Barbara Severance, Integration Manager, JSC, Jennifer Groman, Federal Preservation Officer, NASA Headquarters and Ralph Allen, Historic Preservation Officer , Marshall Space Flight Center. The field work and measured drawings were prepared under the general direction of Richard O'Connor, Chief, Heritage Documentation Programs, National Park Service. The project was managed by Thomas Behrens, HAER Architect and Project Leader. The Space Transportation System Recording Project consisted architectural delineators, John Wachtel, Iowa State and Joseph Klimek, Illinois Institute of Technology. This documentation is based high-definition laser scans provided by Smart GeoMetrics, Houston, Texas and documentation provided by NASA's Headquarters, Johnson Space Center and Marshall Space Flight Center. Written historical and descriptive data was provided by Archaeological Consultants Inc., Sarasota, Florida. Large-format photographs were produced by NASA's Imaging Lab at Johnson Space Flight Center with supplimental images provided by Jet Lowe, HAER photographer.

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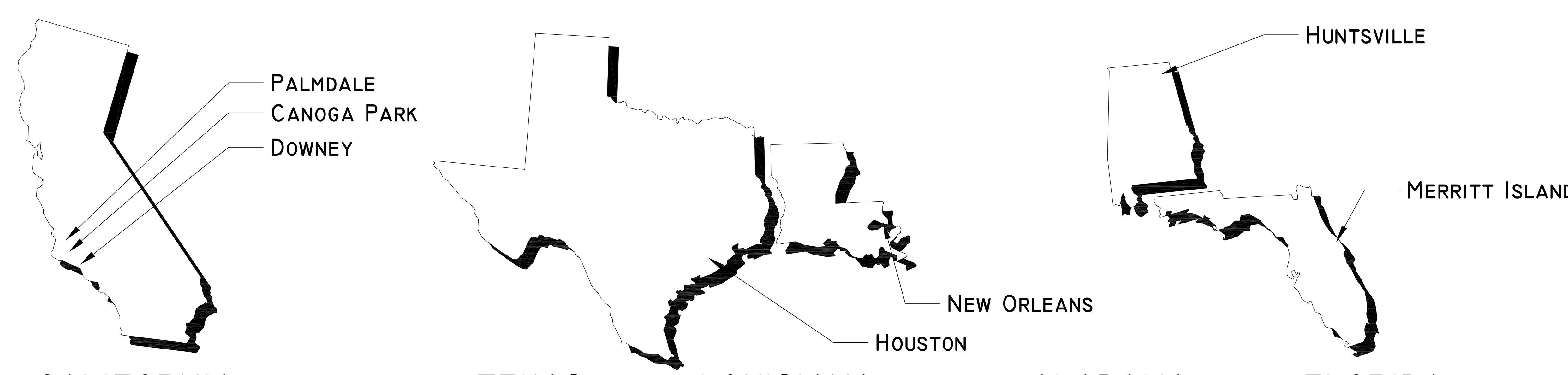

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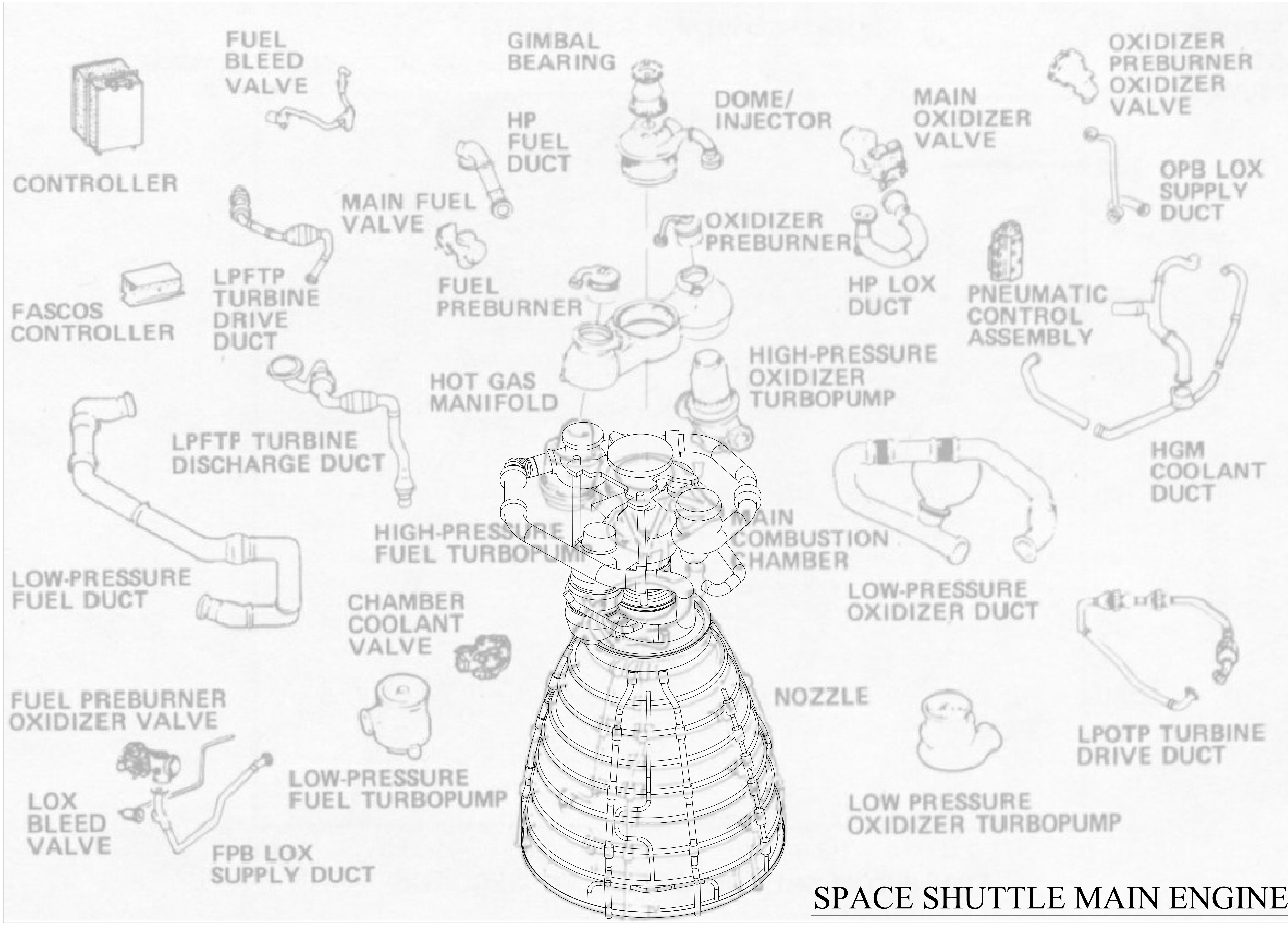

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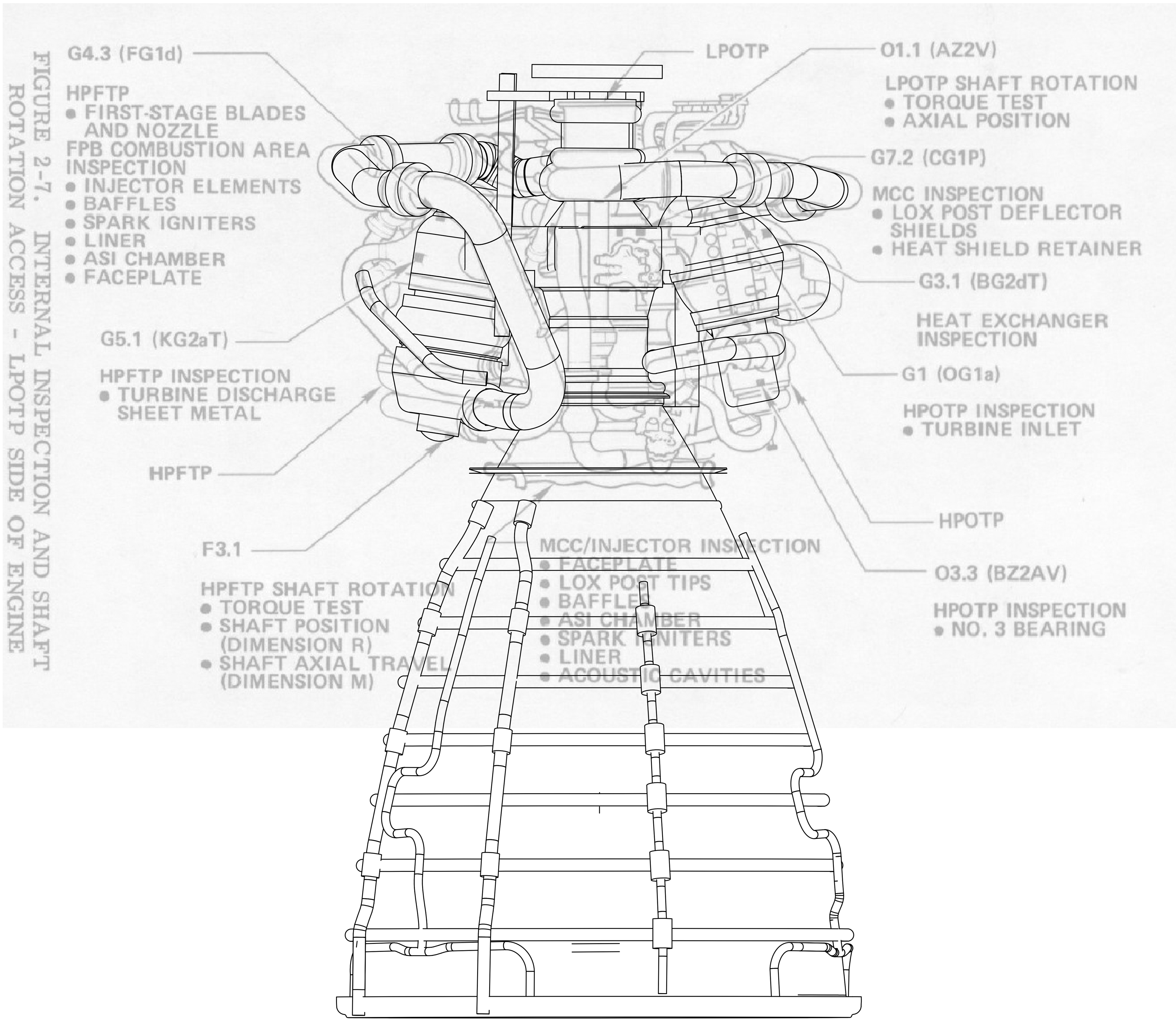

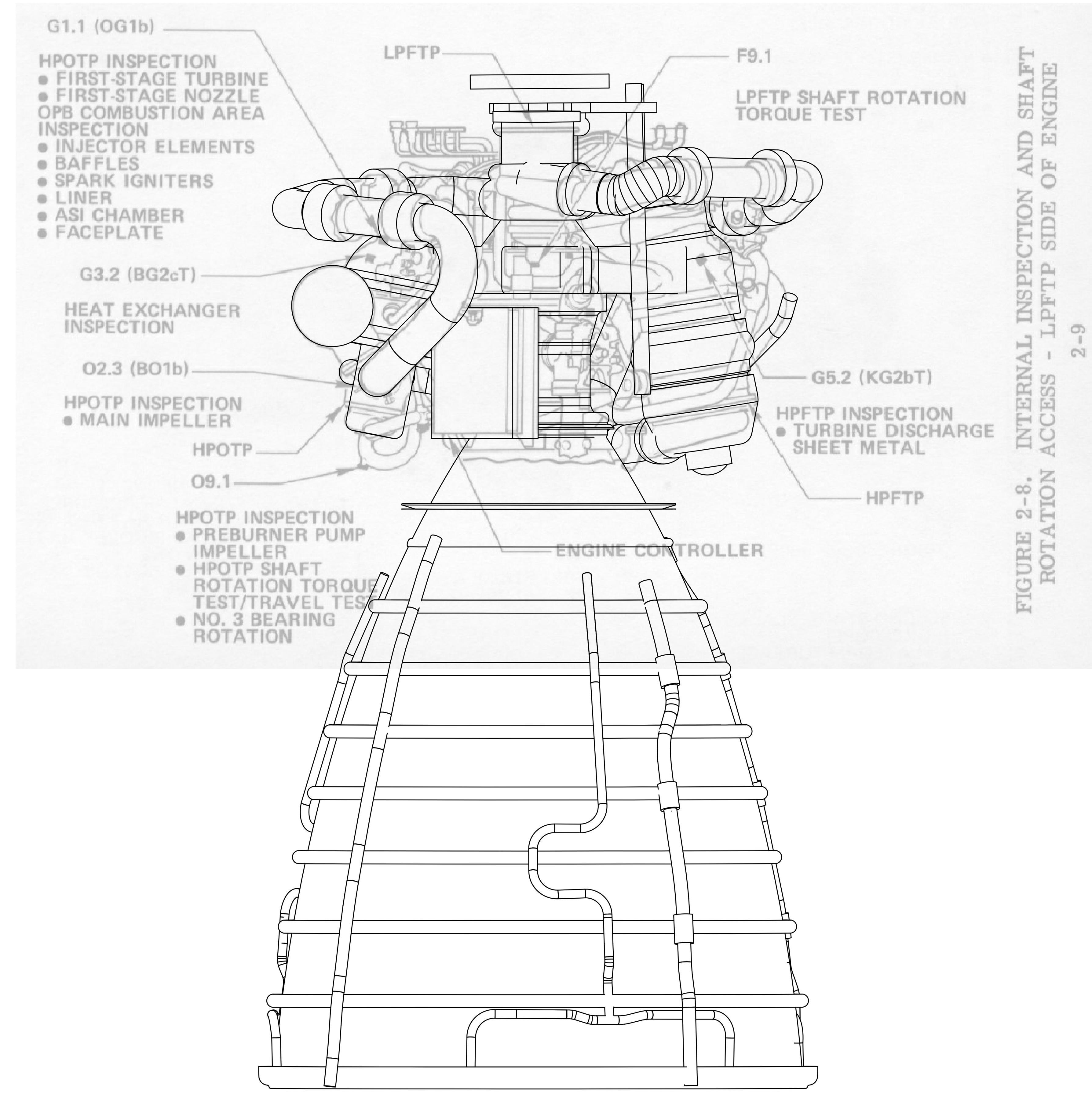

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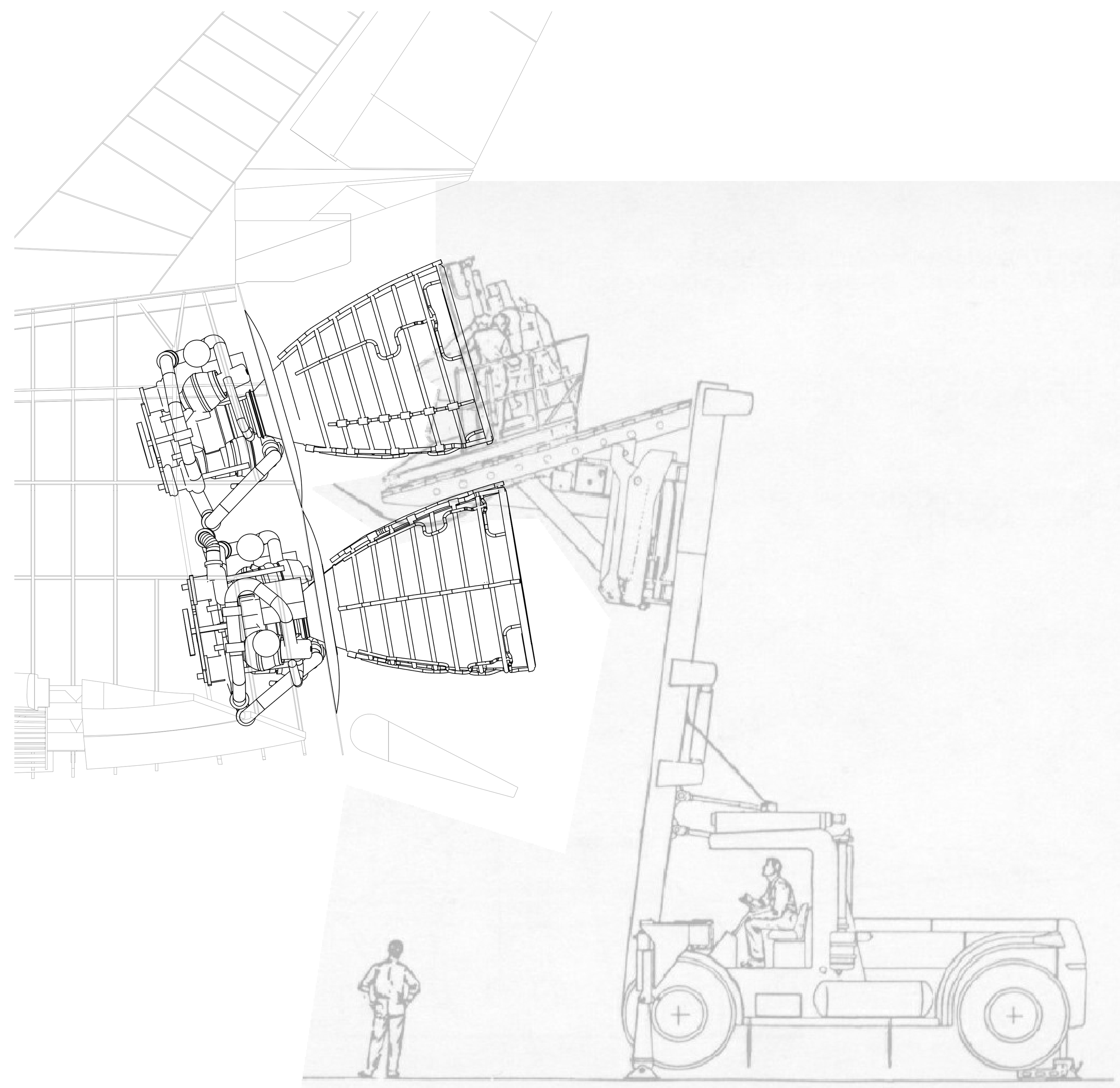

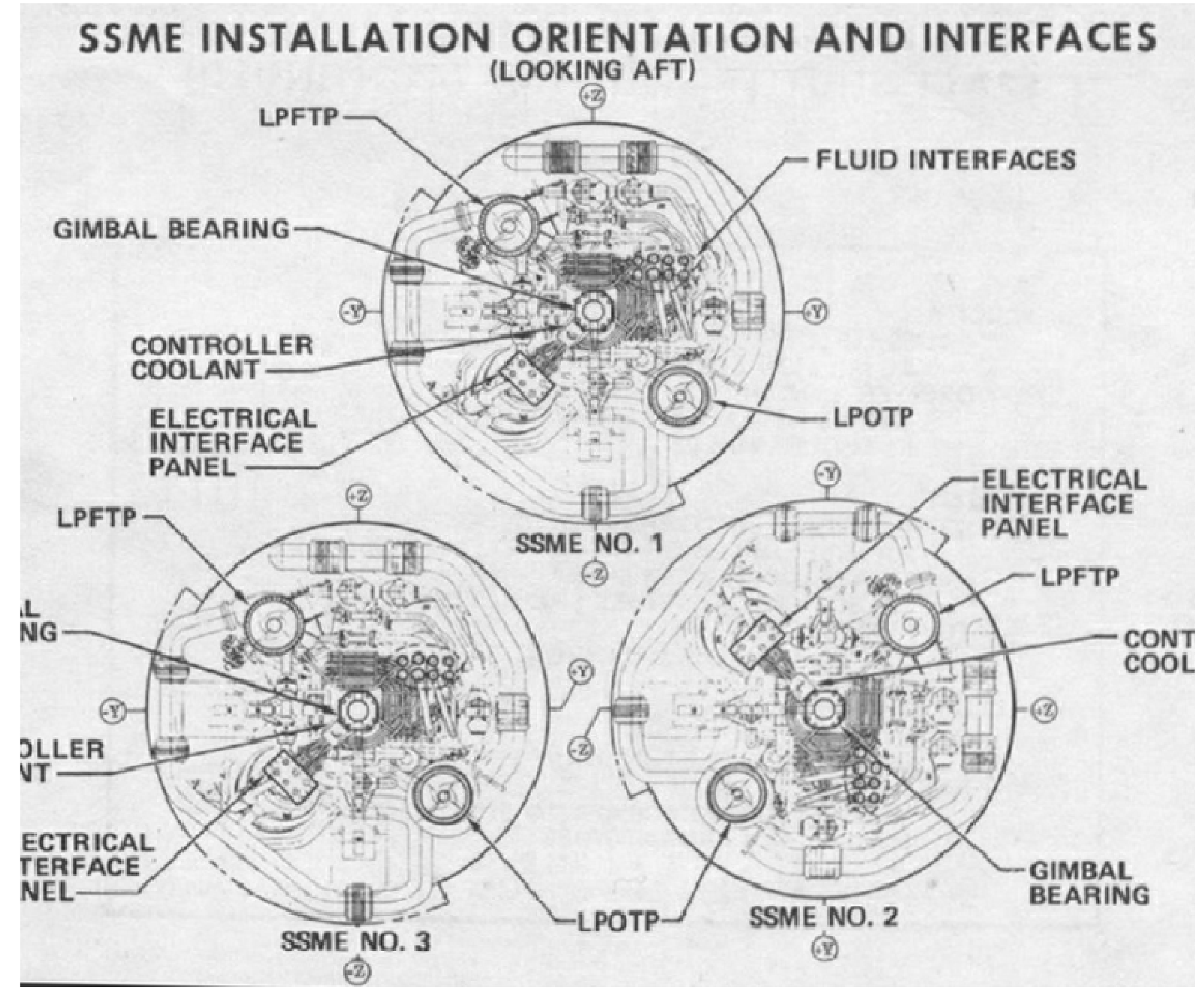

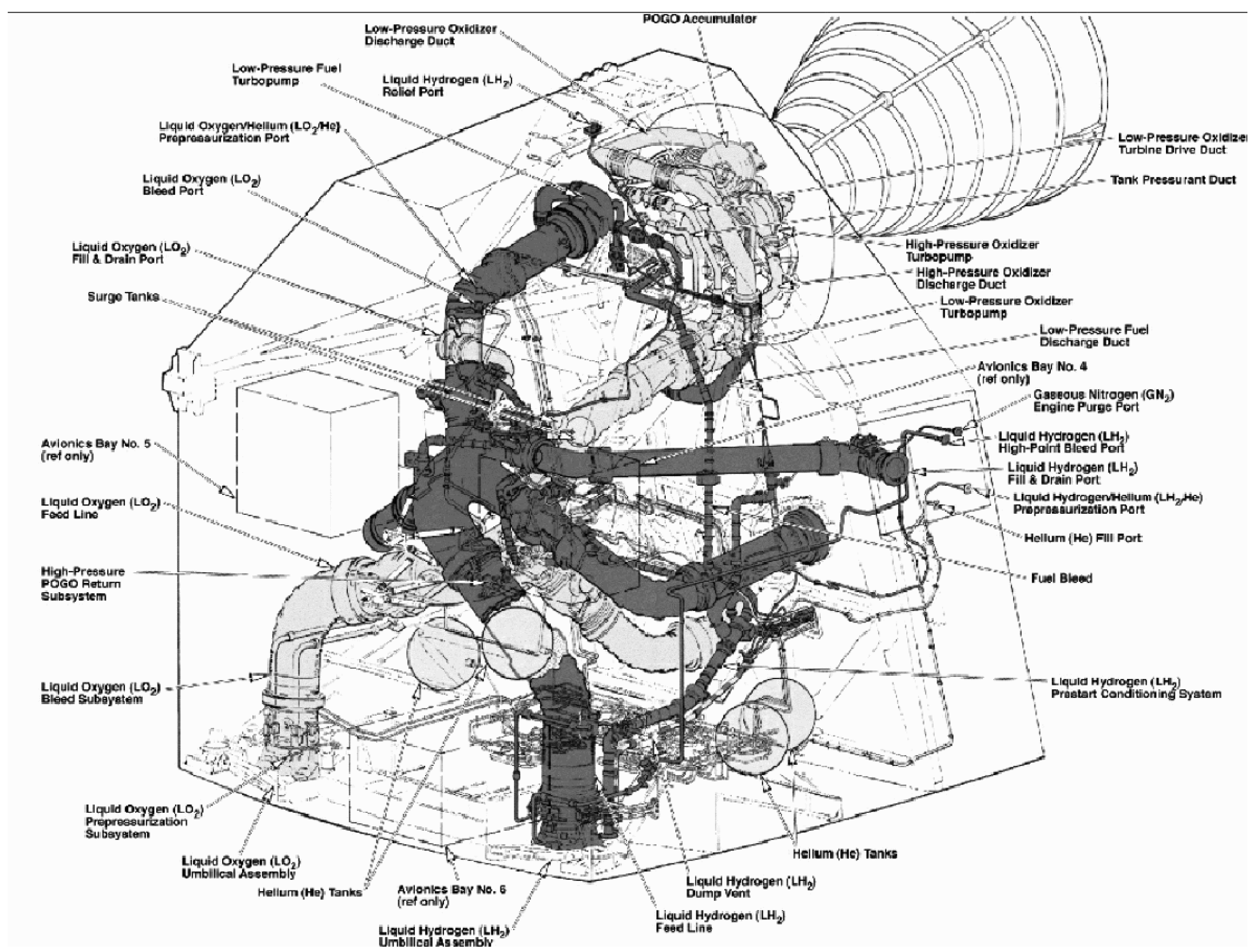

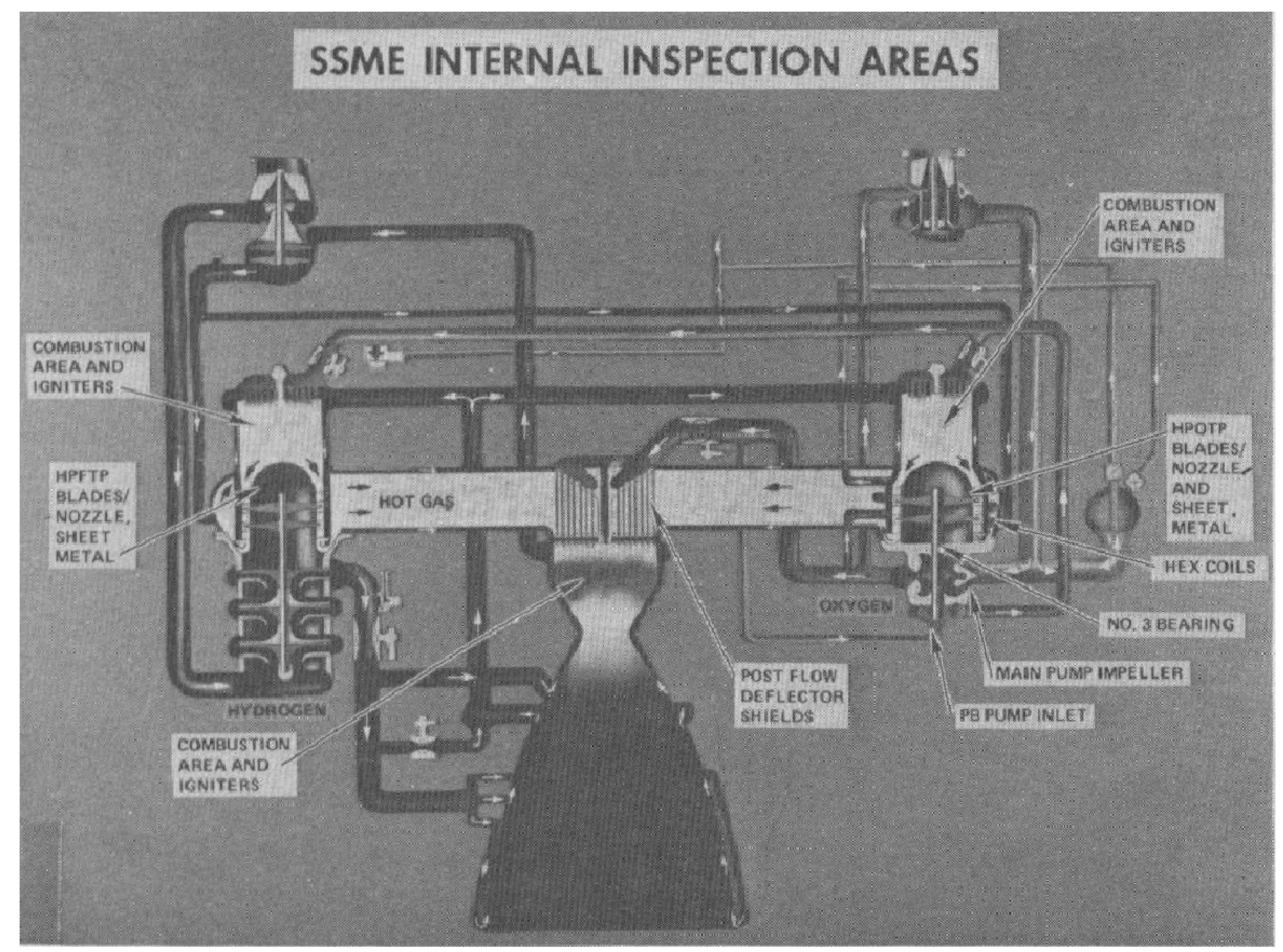

SSME DETAILS AND INSTALLATION

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